(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 005 411 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
01.06.2022 Bulletin 2022/22

(21) Application number: **20909831.8**

(22) Date of filing: **29.09.2020**

(51) International Patent Classification (IPC):
A24F 40/40 *(2020.01)* ***A24F 40/46*** *(2020.01)*

(52) Cooperative Patent Classification (CPC):
A24F 40/40; A24F 40/46

(86) International application number:
PCT/CN2020/118753

(87) International publication number:
WO 2021/135462 (08.07.2021 Gazette 2021/27)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **27.05.2020 CN 202010464317**
27.05.2020 CN 202010463655

(71) Applicants:
- **China Tobacco Yunnan Industrial Co., Ltd**
  Kunming, Yunnan 650231 (CN)
- **Zhengzhou Tobacco Research Institute of CNTC**
  Zhengzhou, Henan 450001 (CN)

(72) Inventors:
- **WU, Jun**
  Kunming, Yunnan 650231 (CN)
- **ZHANG, Ke**
  Zhengzhou, Henan 450001 (CN)
- **MIAO, Mingming**
  Kunming, Yunnan 650231 (CN)
- **WANG, Shuang**
  Zhengzhou, Henan 450001 (CN)
- **SHANG, Shanzhai**
  Kunming, Yunnan 650231 (CN)
- **FU, Lili**
  Zhengzhou, Henan 450001 (CN)
- **HAN, Jingmei**
  Kunming, Yunnan 650231 (CN)
- **WANG, Le**
  Zhengzhou, Henan 450001 (CN)
- **LI, Zhiqiang**
  Kunming, Yunnan 650231 (CN)
- **ZHANG, Qi**
  Zhengzhou, Henan 450001 (CN)
- **LEI, Ping**
  Kunming, Yunnan 650231 (CN)
- **WANG, Bing**
  Zhengzhou, Henan 450001 (CN)
- **LV, Xi**
  Kunming, Yunnan 650231 (CN)
- **LI, Bin**
  Zhengzhou, Henan 450001 (CN)
- **YUAN, Dalin**
  Kunming, Yunnan 650231 (CN)
- **LIAO, Siyao**
  Kunming, Yunnan 650231 (CN)

(74) Representative: **Gille Hrabal**
Partnerschaftsgesellschaft mbB
Patentanwälte
Brucknerstraße 20
40593 Düsseldorf (DE)

(54) HEATED TOBACCO PRODUCT HAVING SMALL-SCALE FASTENING AND SEALING FUNCTIONS, AND METHOD FOR USING SAME

(57) The present disclosure belongs to the technical field of heating smoking set, and in particular, to a heating smoking set with a micro-motion clamping and sealing function and a method using the smoking set. The sealed heating smoking set includes a circular micro-motion clamp, and the micro-motion clamp includes: a micro-motion swivel (1) and a sliding wheel (12) linked to the micro-motion swivel, a plurality of clamping blocks (2), each of the clamping blocks (2) is provided with a rotation axis (21) and a sliding groove (22); the sealed heating smoking set further includes a sealed heating cavity and an airflow disturbance component. When the sealed heating smoking set is used with oxygen-depleted heating cigarettes, the micro-motion clamp can seal the sealed heating cavity and clamp the cigarettes, so that external oxygen may not enter the sealed accommodating cavity, and the oxygen content of the tobacco segment can be reduced during smoking, thus the heating temperature

EP 4 005 411 A1

of the cigarette can be increased without worrying about burning of the cigarette, and the release of tobacco aroma components can be increased.

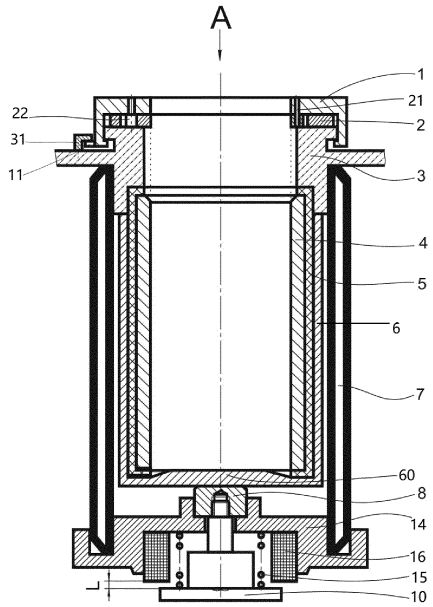


FIG.2

Description

TECHNICAL FIELD

[0001] The present disclosure belongs to the technical field of heating smoking set, and in particular, to a heating smoking set with a micro-motion clamping and sealing function and a method using the smoking set.

BACKGROUND

[0002] Traditional cigarettes release nicotine and flavor components in tobacco through combustion to meet the needs of consumers. While heating cigarettes is to heat the tobacco products to the atomization temperature through an external heat source to achieve the effect of producing smoke, moreover, the heating temperature is lower than the combustion temperature of tobacco, which can significantly reduce a large number of harmful substances produced by combustion of cigarettes while reducing the harm of second-hand smoke to non-smokers.

[0003] As the heating temperature of heating cigarettes is lower than the combustion temperature, compared with traditional cigarettes, the tobacco aroma components of heating cigarettes are difficult to completely release and the amount of smoke is insufficient. Thus, such cigarettes are difficult to be accepted by traditional smokers.

[0004] In the process of implementing the present disclosure, the inventor finds that:

1. In case the cigarette accommodating cavity is sealed after the cigarette is inserted into the heating smoking set, the oxygen content in the tobacco section of the cigarette and the cigarette accommodating cavity may decrease in the heating process (due to the displacement of the newly formed fresh smoke on the internal gas), at this time, even if the heating temperature is increased, the cigarette may not burn, which can increase the release of tobacco aroma components.
2. Meanwhile, in order to ensure insertion of cigarettes, the inner diameter of the existing cigarette accommodating cavity is larger than the outer diameter of the cigarette, there is generally a gap between the cigarette accommodating cavity and the cigarette, the cigarette may easily fall in case the connection is not tight.
3. In case the smoking set adopts a closed cigarette heating structure with no air intake at the end (i.e., there is no air intake gap between the cigarette and the cigarette accommodating cavity), when a normal ventilated cigarette (normally ventilated at both ends of the cigarette) is inserted into it, the oxygen content of the tobacco segment may decrease in the heating process, which is due to displacement of the gas inside the cigarette by the newly-formed fresh smoke. While the heating temperature gradually increases, the cigarette may not burn, the tobacco in the cigarette and the air inside the cigarette are rapidly heated from the ambient temperature to the working temperature of the smoking set, at this time, as the internal gas pressure increases, the tobacco aroma components are also discharged out of the smoking set together with the high-pressure gas to form a smoke aerosol. However, as the process of heating the cigarette by the heating element continues, the heat is rapidly increasing in the continuous heating stage from room temperature to the start of smoking. When the heating element reaches the working temperature, the temperature does not increase any more, and the increase in the overflow of the smoke aerosol in the cigarette accommodating cavity is not as high as that in the heating stage. Since there is no continuous airflow through the tobacco section, the natural overflow of smoke aerosol may be obviously insufficient only by pressure difference or the effect of the filter of the cigarette, causing the problem of insufficient smoke after 1/5 of the cigarette is smoked.

[0005] The present disclose is proposed to solve the above-mentioned problems.

SUMMARY

[0006] A first aspect of the present disclosure provides a heating smoking set with a micro-motion clamping and sealing function, the heating smoking set includes a circular micro-motion clamp, and the micro-motion clamp includes: a micro-motion swivel 1 and a sliding wheel 12 linked to the swivel, as well as a plurality of clamping blocks 2;

Wherein, a rotation axis 21 and a sliding groove 22 are provided on each clamping block 2;
The micro-motion swivel 1 includes a circular structure, and the center hole radius of the circular structure is R;
The clamping block 2 is provided with a circular arc structure, and the radius of the circular inner circle is R;
Each of the sliding wheels 12 is mounted on the inner end surface of the micro-motion swivel 1 in a fixed-connection manner;
Each of the clamping blocks 2 is also connected to the inner end surface of the micro-motion swivel 1 through the rotation axis 21, and the rotation axis 21 is disposed on the clamping block 2 at a point close to the center of the circle where the arc structure is located;
Each sliding wheel 12 is in sliding connection with each of the clamping blocks 2 at the respective corresponding positions, and each sliding wheel 12 is limited to each of the sliding grooves 22 in a rotating or sliding manner; when the micro-motion swivel 1

rotates, it drives each of the sliding wheels 12 to displace, each of the sliding wheels 12 drives each of the clamping blocks 2 to rotate through the sliding grooves 22, and the center of the inner circle of the clamping blocks 2 moves. The sliding wheels 12 displace in a rotating or sliding manner.

[0007] Preferably, the sealed heating smoking set further includes a sealed heating cavity and an airflow disturbance component, the airflow disturbance component disturbs the cigarettes in the sealed heating cavity through inserting or non-inserting into the sealed heating cavity. The outer diameter of the cigarette is slightly smaller than 2R.

[0008] Preferably, the sliding groove 22 is a waist groove.

[0009] Preferably, the sliding groove 22 has a racetrack shape, namely, a rectangular groove with semicircles at both ends.

[0010] Preferably, the two ends of the circular arc structure of each of the clamping blocks 2 are irregular, and the shapes of the two ends match each other. This may enlarge the circumferential contact area of the clamping block 2 and the cigarette, so as to strengthen the clamping and sealing effect of the clamping block 2 on the cigarette. When the two ends of the clamping block 2 are in contact with each other at the inner circle position, the clamping block 2 can completely seal the sealed heating cavity in the circumferential direction while clamping the cigarette.

[0011] Preferably, the rotation axis 21 is disposed on one end of the clamping block 2 at a point close to the center of the circle where the arc structure is located.

[0012] Preferably, the sum of the central angles of the inner arcs of the circular arc structures of all the clamping blocks is 360 degrees.

[0013] Preferably, the number of the clamping blocks 2 is four.

[0014] Preferably, the inner arc surface of the arc structure of the clamping block 2 is rough or with a non-skid pattern, which can increase friction between the clamping block 2 and the cigarette, so as to strengthen the clamping and sealing effect of the clamping block 2 on the cigarette.

[0015] Preferably, the sealed heating smoking set further includes a base 3 and a sealed heating cavity, the base 3 is disposed between the micro-motion clamp and the sealed heating cavity, the base 3 is connected to the micro-motion clamp and the sealed heating cavity in a snap-fit connection.

[0016] Preferably, the sealed heating smoking set further includes: a circumferential heating element 4, a heat insulating layer 5, and a sealing sleeve 6 distributed in sequence from the inner layer to the outer layer, the inside of the circumferential heating element 4 is the sealed heating cavity.

[0017] The outer surface of the circumferential heating element 4 is wrapped with a layer of heat insulating material as the heat insulating layer 5. Alternatively, a layer of insulating material is distributed or spread in the axial direction of the outer wall of the cylindrical circumferential heating element 4 as the heat insulating layer 5. The heat insulating layer 5 is made of inorganic or polymer materials with good high-heat resistance and low thermal conductivity, such as paper composed of aerogels or synthetic non-metallic materials with high temperature resistance.

[0018] The sealing sleeve 6 is wrapped around the outside of the heat insulating layer 5. The material of the sealing sleeve 6 is high-temperature resistant silicone rubber, etc.

[0019] The base 3 is provided with a circular structure with an inner flange. The upper end of the heat insulating layer 5 wraps the upper end of the circumferential heating element 4. The upper end of the heat insulating layer 5 abuts against the lower end of the inner flange of the base 3. The upper end of the sealing sleeve 6 abuts against the lower end of the main body of the base 3. This can insulate the base 3 and better seal the sealed heating cavity.

[0020] Preferably, a locking device is provided on the sealed heating smoking set, so as to lock the clamping block 2 and/or the micro-motion swivel 1.

[0021] Preferably, the locking device includes:

A positioning block 11 fixedly connected to the lower edge of the micro-motion swivel 1;

A limiting block 31 is fixedly connected to the sealed heating smoking set, an L-shaped space is cut inside the limiting block 31, the top surface of the space matched with the positioning block 11 is a slope with a certain angle, when the positioning block 11 is rotated to the limit position of the L-shaped space, the positioning block 11, together with the micro-motion swivel 1, is limited and locked; at this time, the position of the clamping block 2 is precisely locked.

[0022] The limiting block 31 is fixed on the base 3, the limiting block is a cylinder with an L-shaped space cut inside.

[0023] The first design method of the non-plug-in airflow disturbance component is as follows:

The airflow disturbance component is an oscillating component; the sealed heating smoking set further includes a sealed heating component;

The sealed heating set includes: a circumferential heating element 4, a heat insulating layers 5, and a sealing sleeve 6 distributed in sequence from the inner layer to the outer layer; wherein, the circumferential heating element 4 is provided with a hollow structure, and the sealed heating cavity is formed inside, the bottom of the sealing sleeve 6 is provided with an elastic pad 60 for sealing the bottom of the sealed heating cavity; the oscillating component is disposed at the lower part of the sealed heating cav-

ity to generate oscillating squeeze on the elastic pad 60 .

[0024] The first design method of the plug-in airflow disturbance component is as follows:

The airflow disturbance component is an oscillating component; the sealed heating smoking set further includes a sealed heating component;
The sealed heating component includes: a circumferential heating element 4, a heat insulating layer 5, and a sealing sleeve 6 distributed in sequence from the inner layer to the outer layer; wherein, the circumferential heating element 4 is a hollow structure, the sealed heating cavity is formed inside, and the bottom of the sealing sleeve 6 seals the bottom of the sealed heating cavity, the bottom of the sealing sleeve 6 is provided with an elastic vibrating membrane 61, the elastic vibrating membrane 61 is provided with concentric corrugated undulations, and a vibrating through hole 62 is provided on the elastic vibrating membrane 61;
The oscillating component includes:

A swinging needle 13 penetrating the sealing ring 63 and the vibrating through hole 62 and penetrating into the sealed heating cavity;
A power supply device providing power for the swinging needle 13 to wigwag.

[0025] The second design method of the plug-in airflow disturbance component is as follows:

The airflow disturbance component is a heating oscillating component; the sealed heating smoking set further includes a sealing component;
The sealing component includes: a sealing sleeve 6, the inside of the sealing sleeve is a sealing cavity, the bottom of the sealing sleeve 6 is provided with an elastic vibrating membrane 61, the elastic vibrating membrane 61 is provided with concentric corrugated undulations, and a vibrating through hole 62 is provided on the elastic vibrating membrane 61;
The heating oscillating component includes:

A heating swinging needle 19 penetrating the vibrating through hole 62 and into the sealed cavity, and the part of the heating swinging needle 19 inside the sealed cavity is provided with an electric heating function;
A power supply device providing power for the heating swinging needle 19 to wigwag.

[0026] A second aspect of the present disclosure provides a method using the sealed heating smoking set of the first aspect, wherein a cigarette is inserted into the sealed heating cavity, rotate the micro-motion swivel 1 in a certain direction to drive the clamping block 2 to rotate, so as to clamp the cigarette and circumferentially seal the sealed heating cavity, the sealed heating smoking set initiates, users start to smoke.

[0027] The micro-motion swivel 1 is locked by the locking device after rotating a certain angle, at this time, the clamping block 2 is also locked without rebound.

[0028] After smoking, the micro-motion swivel 1 can be unlocked by rotating the micro-motion swivel 1 in the opposite direction, at this time, the cigarette can be taken out.

[0029] The above technical solutions can be freely combined without contradiction.

[0030] The clamping principle of the micro-motion clamp illustrated in Embodiment 1 of the present disclosure is as follows:
As shown in the Figures, FIG. 1a is the initial state of the micro-motion swivel 1, FIG.1b is the state after the micro-motion swivel 1 rotates by a small angle ($\theta 1$-$\theta 2$).

[0031] As shown in FIG.1b, after the cigarette to be smoked is inserted into the bottom of the sealed heating cavity, in the process which the micro-motion swivel 1 rotating the heating element of the present disclosure rotates a slight angle ($\theta 1$-$\theta 2$) to the limit position $\theta 2$, the four sliding wheels 12 fixed on the inner end surface of the micro-motion swivel 1 act on each clamping block 2 through the inner wall of the sliding grooves 22, so that each of the clamping blocks 2 rotates around the rotation axis 21, and the inner loop surface of each of the clamping blocks 2 deviates from the loop surface where the inner wall of the central hole of the micro-motion swivel 1 is located. Wherein, taking the clamping block 2 in the upper left of the figure as an example, the center of the inner ring surface deviates from the point O in FIG.1a to the point N in FIG.1b (the remaining three clamping blocks may not be repeated by analogy), the deviation in the horizontal direction is Δx, bringing compression to the lower part of the inserted cigarette filter end.

[0032] Therefore, under the relative friction of the inner ring of the clamping block 2 (preferably the inner ring surface is provided with horizontal or vertical stripes, or a surface with relatively high roughness) and squeezing of the four clamping blocks 2 that insert the cigarette into the central hole, so as to clamp the cigarette; at this position, the micro-motion swivel 1 can be locked by the locking device until the inserted cigarette is smoked, and the micro-motion swivel 1 can be unlocked and taken out smoothly when needed.

[0033] The working principle of the locking device is:
The positioning block 11 is fixedly connected with the lower edge of the micro-motion swivel 1.

[0034] The limiting block 31 is fixedly connected to the base 3 and corresponds to two limit position changes of the clamping block 2. When the micro-motion swivel 1 rotates by an angle of $\theta 1$-$\theta 2$, the positioning block 11 rotates to the position defined by the limiting block 31, an L-shaped space is cut inside the limiting block 31, and the top surface of the space matched with the positioning block 11 is a slope with a small angle, when the position-

ing block 11 rotates to its inner limit position, the positioning block 11, together with the micro-motion swivel 1, is limited to the angle θ1-θ2, at this time, the inner clamping block 2 can clamp the cigarette.

[0035] The relative positions of the limiting block 31 and the positioning block 11 on the micro-motion swivel 1 are shown in FIG.3. The initial position of the positioning block 11 is shown by the solid line. After rotating the angle θ1-θ2, the position is shown by the dotted line in the limiting block 31, which is the locking position of the micro-motion swivel 1 at this time.

[0036] The relative positions of the limiting block 31 and the positioning block 11 can be adjusted based on the outer diameter of the cigarette.

[0037] Certainly, other locking devices can also be used in the present disclosure, as long as the clamping block 2 and/or the micro-motion swivel 1 can be locked.

[0038] The present disclosure has the following beneficial effects:

1. The present disclosure designs for the first time a sealed heating smoking set including a micro-motion clamp, the clamp is installed in the smoking set, which can clamp and seal the cigarette in the circumferential direction. The micro-motion clamp includes a micro-motion swivel and a plurality of clamping blocks. After the cigarette is inserted, the micro-motion swivel can be rotated to clamp and circumferentially seal the cigarette, which is convenient to use. When the sealed heating smoking set is used in combination with ordinary cigarettes, it can clamp and fix the cigarettes while preventing the cigarettes from falling out of the sealed accommodating cavity. When the sealed heating cigarette is used with oxygen-depleted heating cigarettes, the micro-motion clamp can seal the sealed heating cavity and clamp the cigarettes, external oxygen may not enter the sealed accommodating cavity, and the oxygen content of the tobacco segment can be reduced during smoking, so that the heating temperature of the cigarette can be increased without worrying about burning of the cigarette, and the release of tobacco aroma components can be increased.

2. As the main clamping part of the micro-motion clamp is the clamping block 2, the inner diameter of the clamping block 2 after clamping can be adapted to the outer diameter of the cigarette, thus a smoking set can be adapted to cigarettes of various diameters, while maintaining the best clamping and sealing effect.

3. In the preferred technical solution, the sealed heating smoking set is also provided with an airflow disturbance component, including disturbing the smoke in the sealed heating cavity through inserting or non-inserting into the sealed heating cavity.

4. In the preferred technical solution, an automatic locking device is also designed to lock the clamping block 2 and/or the micro-motion swivel 1, without worrying about rebound. The locking device only includes the positioning block 11 and the limiting block 31, so that the design is simplified and convenient for operation.

5. In the preferred technical solution, the present disclosure adds a mechanism or device for continuous discharge of subsequent smoke, e.g., the smoke in the sealed heating cavity is disturbed through squeezing the movable hammer or swinging the swinging needle, so that the aerosol temporarily "sealed" in the sealed heating cavity is agitated and extruded in large doses, so as to realize continuous and sufficient smoke guarantee during the whole process of smoking.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039]

FIG.1 is a schematic view of the micro-motion clamp of Embodiment 1.

FIG.2 is a cross-sectional schematic view of a sealed heating smoking set with a non-plug-in airflow disturbance component of Embodiment 1.

FIG.3 is a view showing the relative positions of the limiting block 31 and the positioning block 11 on the micro-motion swivel 1 of Embodiment 1.

FIG.4 is a schematic view of the parts of the limiting block 31 of Embodiment 1.

FIG.5 is a schematic view of parts of another limiting block 31 of Embodiment 1.

FIG.6 is a cross-sectional schematic view of a sealed heating smoking set with a first plug-in airflow disturbance component of Embodiment 2.

FIG.7 is a schematic view of the parts of the swinging needle 13 of Embodiment 2.

FIG.8 is a cross-sectional schematic view of a sealed heating smoking set with a second plug-in airflow disturbance component of Embodiment 3.

FIG.9 is a schematic view of the parts of the heating swinging needle 19 of Embodiment 3.

FIG.10 is a schematic view of the power supply device of Embodiment 4.

FIG.11 is a cross-sectional schematic view of a sealed heating smoking set with a micro-motion clamp of Embodiment 5.

[0040] List of signs in the drawings:

1. Micro-motion swivel, 11. Positioning block, 12. Sliding wheel, 2. Clamping block, 21. Rotation axis, 22. Sliding groove, 3. Base, 31. Limiting block, 4. Circumferential heating element, 5. Heat insulating layer, 6. Sealing sleeve, 60. Elastic pad, 61. Elastic vibrating membrane, 62. Vibration through hole, 63. Sealing ring, 7. Heat insulation sleeve, 8. Movable hammer, 10. First ferromagnetic material block, 13. Swinging needle, 131. Fin, 132. Magnetic sheet, 14. Base, 141. Through hole, 15. Spring, 16. Coil, 19. Heating swinging needle, 191. Heating

swinging needle fin, 192. Heating swinging needle magnetic sheet, 20. Lubricating ring, 211. Iron core, m. Slope surface, n. Limiting surface, p. Positioning surface, q. Positioning pile.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0041] The present disclosure will be further explained below through specific embodiments.

Embodiment 1

[0042] As shown in FIGS. 1-5, a sealed heating smoking set with a micro-motion clamp and an airflow disturbance component, the sealed heating smoking set includes a circular micro-motion clamp, and the micro-motion clamp includes: one micro-motion swivel 1 and four sliding wheels 12 linked to it, four clamping blocks 2;

Wherein, one rotation axis 21 and one sliding groove 22 are provided on each clamping block 2;
The micro-motion swivel 1 includes a circular structure, and the center hole radius of the circular structure is R;
The clamping block 2 is provided with a circular arc structure, and the radius of the circular inner circle is R;
Each of the sliding wheels 12 is mounted on the inner end surface of the micro-motion swivel 1 in a fixed-connection manner;
Each of the clamping blocks 2 is also connected to the inner end surface of the micro-motion swivel 1 through the rotation axis 21, and the rotation axis 21 is disposed on the clamping block 2 at a point close to the center of the circle where the arc structure is located;
Each sliding wheel 12 is in sliding connection with each of the clamping blocks 2 at respective corresponding positions, and each sliding wheel 12 is limited in each of the sliding grooves 22 in a rotating or sliding manner.

[0043] The sliding groove 22 is provided with a racetrack shape, namely, a rectangular groove with semicircles at both ends.

[0044] The two ends of the circular arc structure of each clamping block 2 are irregular, and the shapes of the two ends match each other.

[0045] The rotation axis 21 is disposed on one end of the clamping block 2 at a point close to the center of the circle where the arc structure is located.

[0046] The sum of the central angles of the inner arcs of the circular arc structures of the four clamping blocks 2 is 360 degrees.

[0047] In case the micro-motion swivel 1 rotates itself, it drives each of the sliding wheels 12 to displace, each of the sliding wheels 12 drives each of the clamping blocks 2 to rotate through the sliding grooves 22, and the center of the inner circle of the clamping blocks 2 moves.

[0048] The inner circular surface of the arc structure of the clamping block 2 is a surface with horizontal or vertical stripes, or a surface with relatively high surface roughness.

[0049] The sealed heating smoking set further includes a base 3 and a sealed heating cavity, the base 3 is disposed between the micro-motion clamp and the sealed heating cavity, the base 3 is connected to the micro-motion clamp and the sealed heating cavity in a snap-fit connection.

[0050] The sealed heating smoking set further includes: a circumferential heating element 4, a heat insulating layer 5, a sealing sleeve 6 and a heat insulating sleeve 7 distributed from the inner layer to the outer layer.

[0051] Inside the circumferential heating element 4 is the sealed heating cavity. The outer surface of the circumferential heating element 4 is wrapped with a layer of heat insulating material, that is, a heat insulating layer 5. The heat insulating layer 5 is made of a high temperature resistant synthetic non-metallic material.

[0052] The sealing sleeve 6 is wrapped around the outside of the heat insulating layer 5. The sealing sleeve 6 is made of high temperature resistant silicone rubber.

[0053] The base 3 is provided with a circular structure with an inner flange. The upper end of the heat insulating layer 5 wraps the upper end of the circumferential heating element 4. The upper end of the heat insulating layer 5 abuts against the lower end of the inner flange of the base 3. The upper end of the sealing sleeve 6 abuts against the lower end of the main body of the base 3. This can insulate the base 3 and better seal the sealed heating cavity.

[0054] The sealed heating smoking set is provided with a locking device, which can lock the clamping block 2 or the micro-motion swivel 1. The locking device includes:

A positioning block 11 fixedly connected to the lower edge of the micro-motion swivel 1;
A limiting block 31 is fixedly connected to the sealed heating smoking set, an L-shaped space is cut inside the limiting block 31, the top surface of the space matched with the positioning block 11 is a slope with a certain angle, when the positioning block 11 is rotated to the limit position of the L-shaped space, the positioning block 11, together with the micro-motion swivel 1, is limited and locked. At this time, the position of the clamping block 2 is precisely locked.

[0055] The limiting block 31 is fixed on the base 3, which is a cylinder with an L-shaped space cut inside. Certainly, the limiting block 31 is not limited to this shape.

[0056] The view of the parts of the limiting block 31 is shown in FIG.4. When in use, the limiting block is installed upside down on the base 3 and in a position that matches with the positioning block 11, as shown in FIG.2. The limiting block 31 has a small-angle slope surface m, and the side surface perpendicular to the slope surface m is

the limiting surface n, the limiting surface n can be used as a stopper for limiting the movement of the positioning block 11.

[0057] Another embodiment of the limiting block 31 is shown in FIG.5, the main body of the limiting block 31 is a cylinder after cutting. The cutting method is as follows: in the height direction: cut 3/4 along the height direction of the cylinder; in the horizontal direction: cut 1/2~2/3 along the diameter direction of the cylinder.

[0058] The remaining part of the upper surface of the cylinder is the contact surface with the base 3 when the cylinder is installed on the base 3 as the installation surface. One side of the installation surface is a combination of a slope surface m having a certain angle with the installation surface and a positioning surface p parallel to the installation surface. A positioning pile q is also fixedly connected to the positioning surface p, which is set in a self-locking position corresponding to the rotation of the micro-motion swivel 1 by a small angle ($\theta 1$-$\theta 2$). This embodiment has better processability.

[0059] An airflow disturbance component is also provided in Embodiment 1, the airflow disturbance component is a non-plug-in type, and the specific design is as follows:

[0060] The bottom of the sealing sleeve 6 is provided with an elastic pad 60 for sealing the bottom of the sealed heating cavity, and the elastic pad 60 is a rubber pad.

[0061] The oscillating component is disposed at the lower part of the sealed heating cavity to generate oscillating squeeze on the elastic pad 60.

[0062] Wherein, the oscillating component includes: a movable hammer 8, a coil 16, a spring 15, and a first ferromagnetic material block 10.

[0063] In FIG.2, the movable hammer 8 includes two parts, a beating part directly in contact with the elastic pad 60 and a three-step columnar supporting part fixed under the beating part, the first-step columnar portion of the columnar supporting part is wrapped inside the beating part. The movable hammer 8 can move up and down, and the first ferromagnetic material block 10 is fixedly connected to the supporting part of the movable hammer 8 as a whole.

[0064] The oscillating component further includes a base 14 with a cavity inside and a through hole at the upper end, the coil 16 is fixed inside the cavity of the base 14, the beating part and the supporting part of the movable hammer 8 squeeze the elastic pad 60 through the through hole.

[0065] The base 14 also supports and fixes the sealed heating cavity and the heat insulating sleeve 7, the base is made of high temperature resistant synthetic material. One end of the spring 15 abuts against the first ferromagnetic material block 10, and the other end abuts against the base 14.

[0066] Preset the conduction frequency of the coil 16 to 0.5Hz. Certainly, the above-mentioned coil 16 can also be replaced by an electromagnet. The coil 16 is disposed between the first ferromagnetic material block 10 and the elastic pad 60.

[0067] When the coil 16 is deenergized, the distance between the first ferromagnetic material block 10 and the coil 16 (the distance here refers to the length of the gap between the two in the vertical direction) is L, the spring 15 is in a compressed state at this time, and the movable hammer is in contact with the elastic pad 60 without squeezing;

When the coil 16 is energized, the first ferromagnetic material block 10 is attracted by the coil 16, the distance L between the two becomes smaller, and the variation is 1 mm, the movable hammer 8 squeezes the elastic pad 60, and the spring 15 is further compressed at this time.

[0068] In case the coil 16 is conducted at a certain frequency, the following operations are performed:

1. In case the coil 16 is energized, the movable hammer 8 squeezes the elastic pad 60, and the spring 15 is further compressed;
2. Then, the coil 16 is deenergized, the spring 15 rebounds, driving the movable hammer 8 away from the elastic pad 60;
3. Repeat steps 1 and 2 above, the movable hammer 8 generates a pulse-type oscillating squeeze on the elastic pad 60.

Embodiment 2

[0069] As shown in FIGS.6-7, a sealed heating smoking set with a micro-motion clamp and an airflow disturbance component. The upper part of the sealed heating cavity is sealed by the micro-motion clamp of Embodiment 1.

[0070] The differences from Embodiment 1 are as follows:

The bottom of the sealing sleeve 6 seals the bottom of the sealed heating cavity, and the bottom of the sealing sleeve 6 is provided with an elastic vibrating membrane 61, the elastic vibrating membrane 61 is provided with concentric corrugated undulations, and a vibrating through hole 62 is provided on the elastic vibrating membrane 61.

[0071] The airflow disturbance component is a plug-in oscillating component, and the specific design is as follows:

The oscillating component includes:

A swinging needle 13 penetrating the vibrating through hole 62 and penetrating into the sealed heating cavity;

A power supply device providing power for the swinging needle 13 to wigwag.

[0072] The periphery of the vibrating through hole 62 is surrounded by a sealing ring 63 with a thickness greater than that of the elastic vibrating membrane 61, the swinging needle 13 penetrates the sealing ring 63, and the sealing ring 63 is integrally connected to the elastic vi-

brating membrane 61.

[0073] The sealing ring 63 has the functions of sealing and supporting the swinging needle 13.

[0074] The swinging needle 13 penetrates the elastic vibrating membrane 61 and maintains a relatively sealing performance, under normal atmospheric pressure, there is no gas exchange between the swinging needle 13 and the elastic vibrating membrane 61.

[0075] The sealing ring 63 is integrally formed by die casting. The elastic vibrating membrane 61 is formed by hot pressing.

[0076] The corrugated undulations on the elastic vibrating membrane 61 have a maximum height difference of 1.5mm between peaks and troughs.

[0077] The height of the swinging needle 13 penetrating into the sealed heating cavity is 2/3 of the length of the circumferential heating element 4.

[0078] The upper end of the swinging needle 13 is a smooth tip.

[0079] The swinging needle 13 inside the sealed heating cavity is provided with a fin 131 radially protruding relative to the swinging needle 13, and the fin 131 is perpendicular to the direction in which the swinging needle 13 vibrates from side to side.

[0080] There are four fins 131, which are symmetrically distributed on both sides of the swinging needle 13.

[0081] Wherein, the power supply device is disposed at the lower part of the sealed heating cavity, the power supply device includes: the electromagnet composed of a coil 16 and an iron core 211, a spring 15 and a base 14; the lower end of the swinging needle 13 is provided with a magnetic sheet 132; the magnetic sheet 132 is an iron sheet, and the direction of the magnetic sheet is parallel to the fin 131. FIG.2 is a three-dimensional schematic view of the swinging needle 13 of Embodiment 1.

[0082] The electromagnet and the spring 15 are respectively disposed on both sides of the lower end of the swinging needle 13,

> One end of the spring 15 is connected to the base 14 of the sealed heating smoking set, and the other end is connected to the magnetic sheet 132 of the swinging needle 13; the electromagnet is fixed on the base 14 of the sealed heating smoking set;
>
> The distance between the right end of the electromagnet and the right end of the spring 15 exceeds the original length of the spring 15 by 1.0mm. The conduction frequency of the coil 16 is 0.5Hz. The sealing sleeve 6 is surrounded by a heat insulating sleeve 7 outside.

[0083] The upper part of the base 14 has a positioning through hole 141 that is penetrated by the swinging needle 13. The diameter of the positioning through hole 141 is larger than that of the vibration through hole 62, and the diameter of the positioning through hole 141 is greater than 2mm.

[0084] The base 14 supports the sealed heating cavity so that the thin elastic vibration membrane 61 at the bottom of the sealing sleeve 6 may not be damaged when the smoking cigarette is inserted. The base 14 also supports and fixes the sealed heating cavity and the heat insulating sleeve 7.

[0085] A circular table recessed in the concave groove on the base 14 is disposed between the base 14 and the sealing ring 63, and a lubricating ring 20 is placed inside the circular table, the central hole of the circular table (i.e., where the lubricating ring 20 is located) is coaxial with the positioning through hole 141 with the same diameter.

[0086] The outer diameter of the sealing ring 63 is larger than the diameter of the through hole on the lubricating ring 20. This enables the swinging needle 13 to oscillate left and right within the range defined by the spring 15 and the positioning through hole 141.

[0087] The base 14 supports the sealed heating cavity through the embedded lubricating ring 20, which has a good lubricating effect, so that when the smoking cigarette is inserted, the thin elastic vibrating membrane 61 at the bottom of the sealing sleeve 6 may not be damaged due to excessive friction and vibration of the vibrating membrane may not be greatly damped.

[0088] The lubricating ring 20 is made of high temperature resistant, non-toxic, odorless, self-lubricating materials such as graphite.

[0089] The base 14 also supports and fixes the sealed heating cavity and the heat insulating sleeve 7.

[0090] FIG.7 is a schematic view of the parts of the swinging needle 13.

Embodiment 3

[0091] As shown in FIGS.8-9, a sealed heating smoking set with a micro-motion clamp and an airflow disturbance component.

[0092] The upper part of the sealed heating cavity is sealed by the micro-motion clamp of Embodiment 1.

[0093] The differences from Embodiment 1 are as follows:

The bottom of the sealing sleeve 6 is provided with an elastic vibrating membrane 61, the elastic vibrating membrane 61 is provided with concentric corrugated undulations, and a vibrating through hole 62 is provided on the elastic vibrating membrane 61. The circumferential heating element 4 of Embodiment 1 is replaced with a heating swinging needle 19. The sealing sleeve 6 is wrapped with a heat insulating layer 5 outside.

[0094] The airflow disturbance component is a plug-in heating oscillating component, and the specific design is as follows:

The heating oscillating component includes:

> A heating swinging needle 19 penetrating the vibrating through hole 62 and into the sealed cavity, the part of the heating swinging needle 19 inside the sealed cavity is provided with an electric heating

function;

A power supply device providing power for the heating swinging needle 19 to wigwag.

[0095] The heating section can use any suitable heating rod configuration available.

[0096] The corrugated undulations on the elastic vibrating membrane 61 have a maximum height difference of 1.5mm between peaks and troughs. The height of the heating swinging needle 19 penetrating into the sealing cavity is 2/3 of the length of the sealing cavity. The upper end of the swinging needle is a smooth tip.

[0097] The periphery of the vibrating through hole 62 is surrounded by a sealing ring 63 with thickness greater than that of the elastic vibrating membrane 61, the heating swinging needle 19 penetrates the sealing ring 63, the sealing sleeve 6, the elastic vibrating membrane 61, and the sealing ring 63 are integrally connected. The heating swinging needle 19 penetrates the elastic vibrating membrane 61 and maintains a relatively sealing performance, under normal atmospheric pressure, there is no gas exchange between the heating swinging needle 19 and the elastic vibrating membrane 61. The sealing ring 63 is integrally formed by die casting. The elastic vibrating membrane 61 is formed by hot pressing.

[0098] A heating swinging needle fin 191 radially protruding relative to the heating swinging needle 19 is provided on the heating swinging needle 19 inside the sealed cavity, the heating swinging needle fin 191 is perpendicular to the direction in which the heating swinging needle 19 vibrates from side to side. There are four heating swinging needle fins 191, which are distributed on both sides of the heating swinging needle 19. FIG.9 is a schematic view of the parts of the heating swinging needle 19.

[0099] The heating swinging needle 19 includes a heating section, a heat-insulating section, and a non-heating section, which are connected in an integrated or separate manner from the upper part to the lower part, the heating section is inside the sealing cavity, the heat-insulating section and the non-heating section are outside the sealing cavity, the heating section includes a rod-shaped insulating shell and heating wires inside. The heating swinging needle 19 is provided with a thermocouple as a temperature detection device.

[0100] The power supply device is disposed at the lower part of the sealed cavity, and the power supply device includes: the electromagnet composed of a coil 16 and an iron core 211, a spring 15 and a base 14; the lower end of the heating swinging needle 19 has a heating swinging needle magnetic sheet 192;

The electromagnet and the spring 15 are respectively disposed on both sides of the lower end of the heating swinging needle 19; one end of the spring 15 is connected to the base 14 of the sealed heating smoking set, and the other end is connected to the heating swinging needle magnetic sheet 192 of the heating swinging needle 19; the electromagnet is fixed on the base 14 of the sealed heating smoking set; the distance between the right end of the electromagnet and the right end of the spring 15 exceeds the original length of the spring 15 by 1mm. Namely, when the electromagnet is energized, the electromagnetic force attracts the heating swinging needle magnetic sheet 192 to drive the heating swinging needle 19 to approach the electromagnet, and the spring 15 is stretched. When the electromagnet is deenergized, the spring 15 rebounds and drives the heating swinging needle 19 away from the electromagnet.

[0101] The heating swinging needle magnetic sheet 192 is an iron sheet, and the direction is parallel to the heating swinging needle fin 191. The upper part of the base 14 is provided with a positioning through hole 141 that is penetrated by the heating swinging needle 19, the diameter of the positioning through hole 141 is larger than that of the vibration through hole 62. and the diameter of the positioning through hole 141 is greater than 2 mm; one end of the spring is connected to the base 14 of the sealed heating smoking set. The conduction frequency of the electromagnet is 0.5 Hz. The sealing sleeve 6 is surrounded by a heat insulating sleeve 7 outside.

[0102] A circular table recessed in the concave groove on the base 14 is disposed between the base 14 and the sealing ring 63, and a lubricating ring 20 is placed inside the circular table, the central hole of the circular table (i.e., where the lubricating ring 20 is located) is coaxial with the positioning through hole 141 with the same diameter.

[0103] The outer diameter of the sealing ring 63 is larger than the diameter of the through hole on the lubricating ring 20. This enables the heating swinging needle 19 to oscillate left and right within the range defined by the spring 15 and the positioning through hole 141.

[0104] The base 14 supports the sealed heating cavity through the embedded lubricating ring 20, which has a good lubricating effect, so that when the smoking cigarette is inserted, the thin elastic vibrating membrane 61 at the bottom of the sealing sleeve 6 may not be damaged due to excessive friction and vibration of the vibrating membrane may not be greatly damped.

[0105] The base 14 also supports and fixes the sealed heating cavity and the heat insulating sleeve 7.

[0106] For the above embodiments, the relationship between the spring 15, the magnetic sheet 192 and the electromagnet of the power supply device is only limited to the schematic view of the working principle of the power supply device in FIG.8 of the present disclosure, rather than only limited to the illustrated technical solution that can be implemented.

Embodiment 4

[0107] Embodiment 4 provides two other technical solutions of the power supply device of Embodiment 3:

As shown in FIGS.10a and 10b, the two ends of the magnetic sheet 192 are connected by two identical springs 15, which are respectively fixed in the middle of the base 14. In this way, the heating swinging needle 19 in the

vibration through hole 62 together constitutes a three-point stable support in static condition.

[0108] The electromagnet composed of a coil 16 and an iron core 211 distributed on one side of the heating swinging needle 19, as shown in FIG 10a, is provided with a structure of single-sided electromagnet. Alternatively, electromagnets composed of coils 16 and iron cores 211 distributed on both sides of the heating swinging needle 19, as shown in FIG.10b, are provided with a structure of double-sided electromagnets.

[0109] When the heating cavity starts to work to a stable heating state, the electromagnet starts to work. The structure of the one-side electromagnetic component uses electromagnetic force to disturb the static stable condition of the swinging needle 19, so that the heated tobacco in the cigarette is "stirred", and it is easier for the smoke aerosol generated after heating the cigarette to discharge.

[0110] When using the double-sided electromagnets, the electromagnets on both sides should be conducted in turn, such vibration structure contributes more to the swing generated by the heated cigarette, and it is also easy to achieve a new dynamic balance, thus the "stirring" smoke-generation structure with double-sided electromagnets is preferred.

Embodiment 5

[0111] As shown in FIG 11, a sealed heating smoking set with a micro-motion clamp, the difference from Embodiment 1 is that, there is no airflow disturbance component below the sealed heating cavity.

[0112] The above are only specific embodiments of the present disclosure, the protection scope of the present disclosure is not limited thereto, any person skilled in the art can easily think of changes or substitutions within the technical scope disclosed by the present disclosure, and they shall be covered by the protection scope of the present disclosure. Thus, the protection scope of the present disclosure shall be subject to the protection scope of the claims.

Claims

1. A heating smoking set with a micro-motion clamping and sealing function, wherein the heating smoking set comprises a circular micro-motion clamp, and the micro-motion clamp comprises: a micro-motion swivel (1) and a sliding wheel (12) linked to the swivel, as well as a plurality of clamping blocks (2);

   Wherein, a rotation axis (21) and a sliding groove (22) are provided on each clamping block (2);
   The micro-motion swivel (1) comprises a circular structure, and the radius of the center hole is R;
   The clamping block (2) is provided with a circular arc structure, and the radius of the circular inner circle is R;
   Each of the sliding wheels (12) is mounted on the inner end surface of the micro-motion swivel (1) in a fixed-connection manner;
   Each clamping block (2) is also connected to the inner end surface of the micro-motion swivel (1) through the rotation axis (21), and the rotation axis (21) is disposed on the clamping block (2) at a point close to the center of the circle where the arc structure is located;
   Each sliding wheel (12) is in sliding connection with each of the clamping blocks (2) at respective corresponding positions, and each sliding wheel (12) is limited in each of the sliding grooves (22) in a rotating or sliding manner, in case the micro-motion swivel (1) rotates, it drives each of the sliding wheels (12) to displace, each of the sliding wheels (12) drives each of the clamping blocks (2) to rotate through the sliding grooves (22), and the center of the inner circle of the clamping blocks (2) moves.

2. The sealed heating smoking set of claim 1, wherein the sealed heating smoking set further comprises a sealed heating cavity and an airflow disturbance component, the airflow disturbance component generates disturbance to the cigarettes in the sealed heating cavity through inserting or non-inserting into the sealed heating cavity.

3. The sealed heating smoking set of claim 1 or 2, wherein the sliding groove (22) is a waist groove.

4. The sealed heating smoking set of claim 1 or 2, wherein the two ends of the circular arc structure of each clamping block (2) are irregular, and the shapes of the two ends match each other.

5. The sealed heating smoking set of claim 1 or 2, wherein the rotation axis 21 is disposed on the clamping block 2 at a point close to the center of the circle where the arc structure is located; preferably, the sum of the central angles of the inner arcs of the circular arc structures of all the clamping blocks is 360 degrees.

6. The sealed heating smoking set of claim 1, wherein, the heating smoking set is provided with a locking device, the locking device can lock the clamping block (2) and/or the micro-motion swivel (1).

7. The sealed heating smoking set of claim 2, wherein the sealed heating smoking set further comprises a sealed heating component; the sealed heating component comprises: a circumferential heating element (4), a heat insulating layer (5), and a sealing sleeve (6) distributed in sequence from the inner layer to

the outer layer, wherein, the circumferential heating element (4) is provided with a hollow structure, the sealed heating cavity is formed inside, and the bottom of the sealing sleeve (6) is provided with an elastic pad (60) sealing the bottom of the sealed heating cavity;
The airflow disturbance component is an oscillating component, the oscillating component is disposed at the lower part of the sealed heating cavity to generate oscillating squeeze on the elastic pad (60).

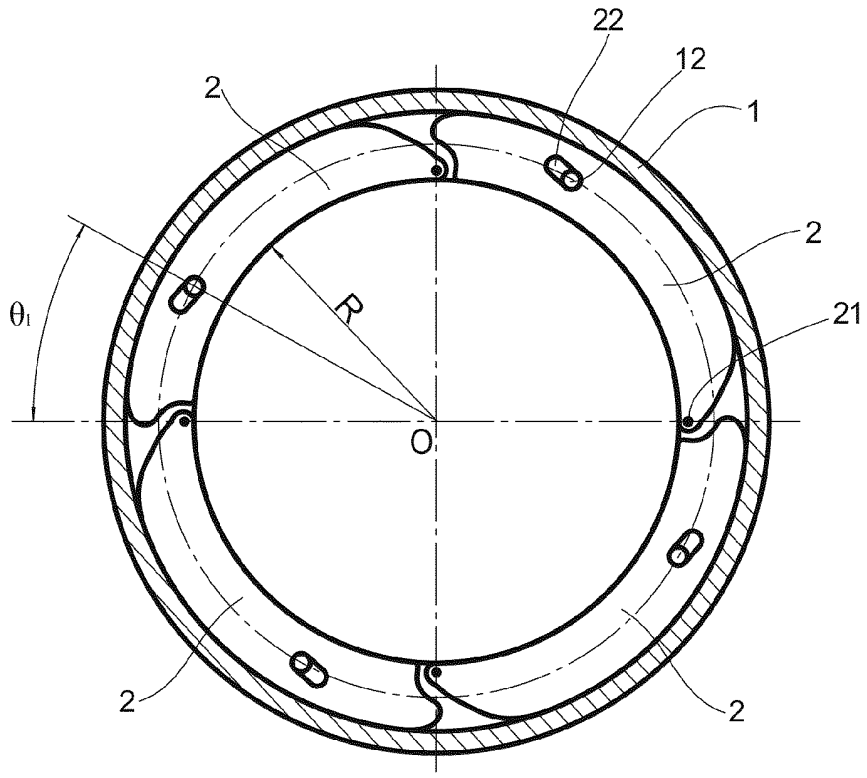
8. The sealed heating smoking set of claim 2, wherein the sealed heating smoking set further comprises a sealed heating component, the sealed heating component comprises: a circumferential heating element (4), a heat insulating layer (5), and a sealing sleeve (6) distributed in sequence from the inner layer to the outer layer, wherein, the circumferential heating element (4) is provided with a hollow structure, the sealed heating cavity is formed inside, and the bottom of the sealing sleeve (6) seals the bottom of the sealed heating cavity, the bottom of the sealing sleeve (6) is provided with an elastic vibrating membrane (61), the elastic vibrating membrane (61) is provided with concentric corrugated undulations, and a vibrating through hole (62) is provided on the elastic vibrating membrane (61);
The airflow disturbance component is an oscillating component, and the oscillating component comprises:

A swinging needle (13) penetrating the vibrating through hole (62) and into the sealed heating cavity;
A power supply device providing power for the swinging needle (13) to wigwag.

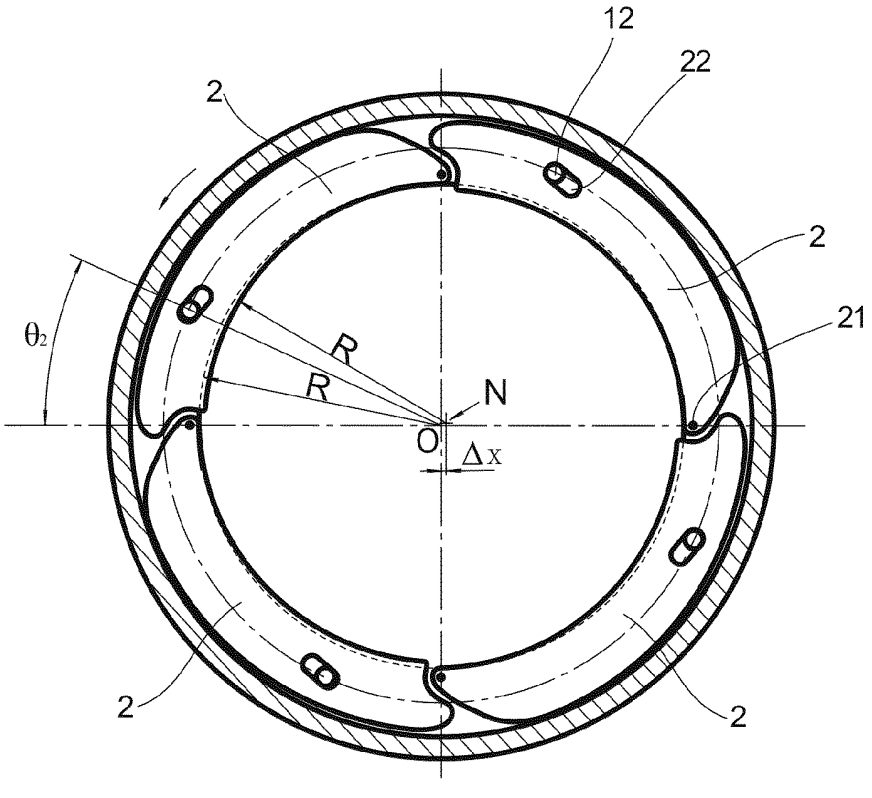
9. The sealed heating smoking set of claim 2, wherein, the sealed heating smoking set further comprises a sealing component, and the sealing component comprises: a sealing sleeve (6), the interior of the sealing sleeve is a sealing cavity, the bottom of the sealing sleeve (6) is provided with an elastic vibrating membrane (61), the elastic vibrating membrane (61) is provided with concentric corrugated undulations, and a vibrating through hole (62) is provided on the elastic vibrating membrane (61);
The airflow disturbance component is a heating oscillating component, and the heating oscillating component comprises:

A heating swinging needle (19) that penetrates the vibrating through hole (62) and into the sealed cavity, and a part of the heating swinging needle (19) inside the sealed cavity is provided with an electric heating function;
A power supply device provides power for the heating swinging needle (19) to wigwag.

10. The method using a sealed heating smoking set of claim 1 or 2, wherein, a cigarette is inserted into the sealed heating cavity, rotate the micro-motion swivel (1) in a certain direction, which may drive the clamping block (2) to rotate, so as to clamp the cigarette and circumferentially seal the sealed heating cavity, the sealed heating smoking set initiates, users start to smoke.



a



b

FIG.1

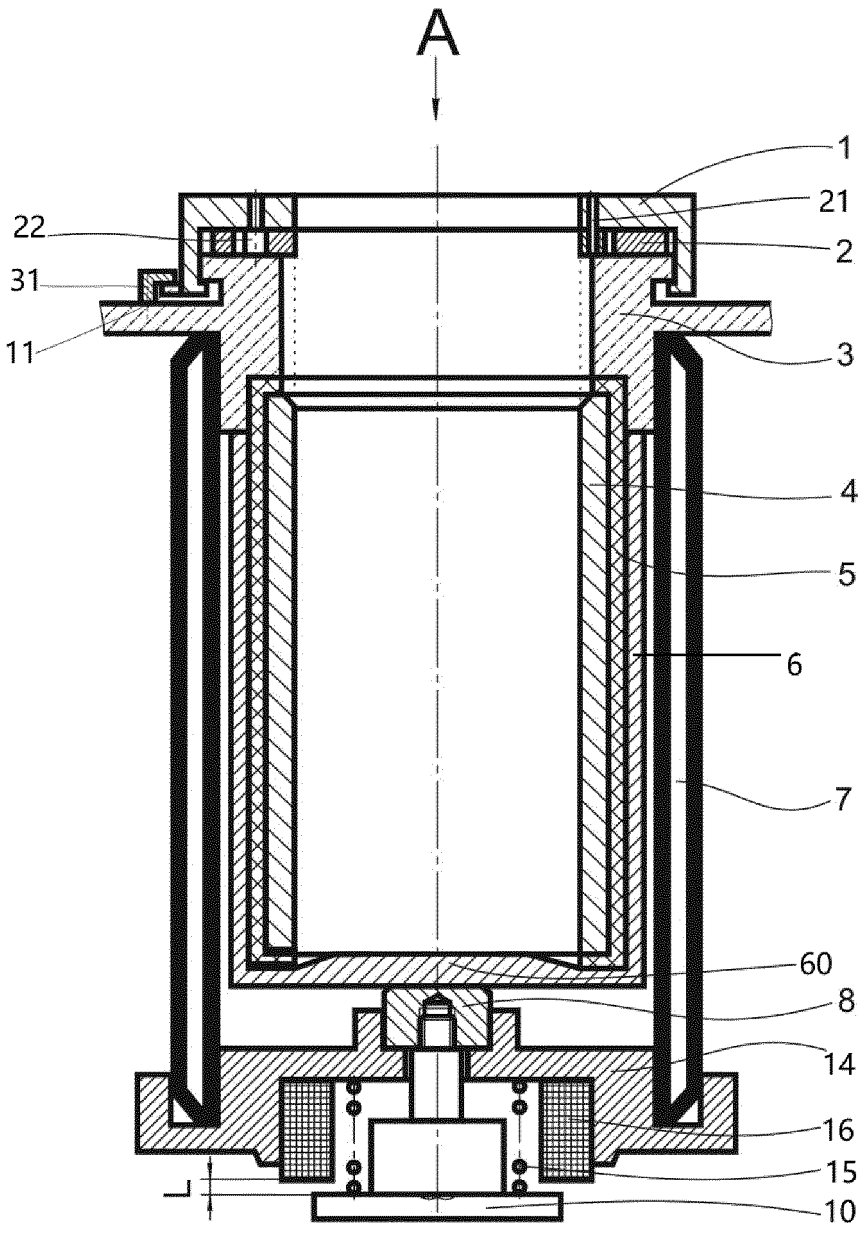


FIG.2

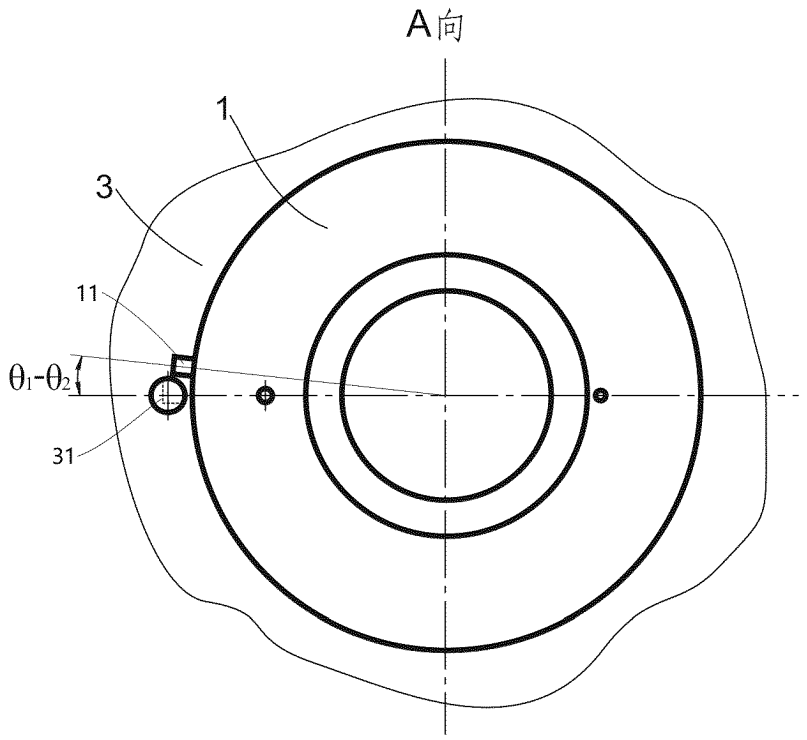


FIG.3

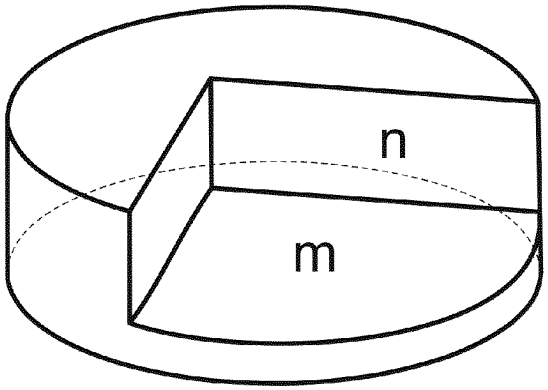


FIG.4

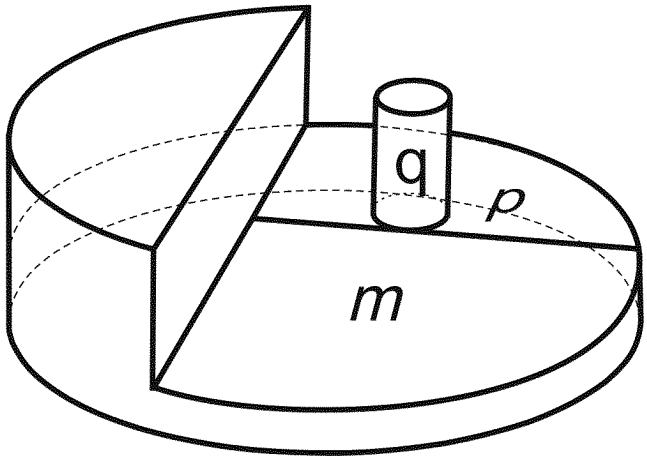


FIG.5

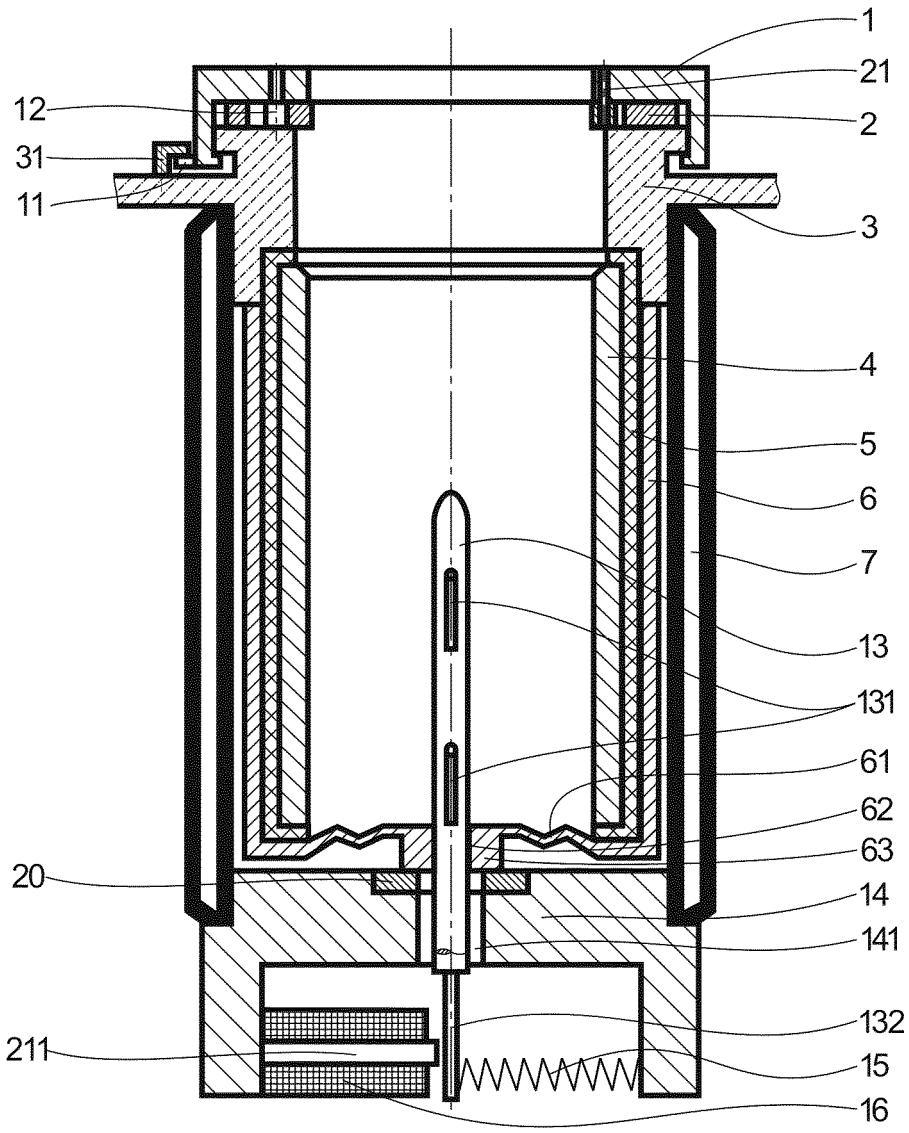

1
21
12
2
31
11
3
4
5
6
7
13
131
61
62
63
20
14
141
132
211
15
16

FIG.6

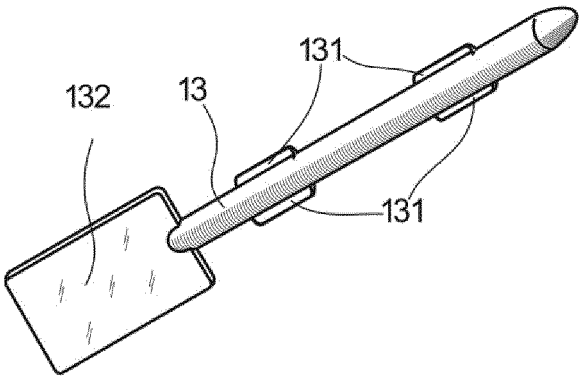

131
132
13
131

FIG.7

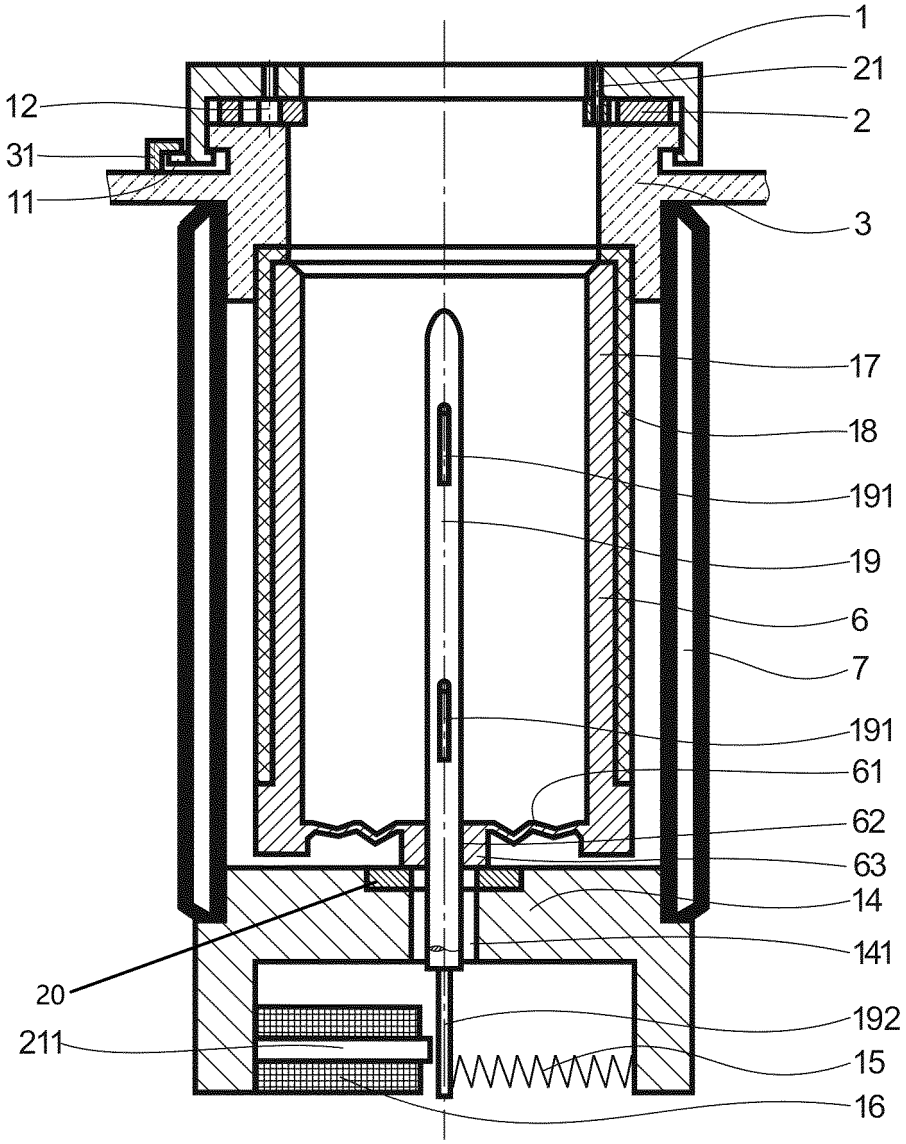

1
21
12
2
31
11
3
17
18
191
19
6
7
191
61
62
63
14
141
20
192
211
15
16

FIG.8

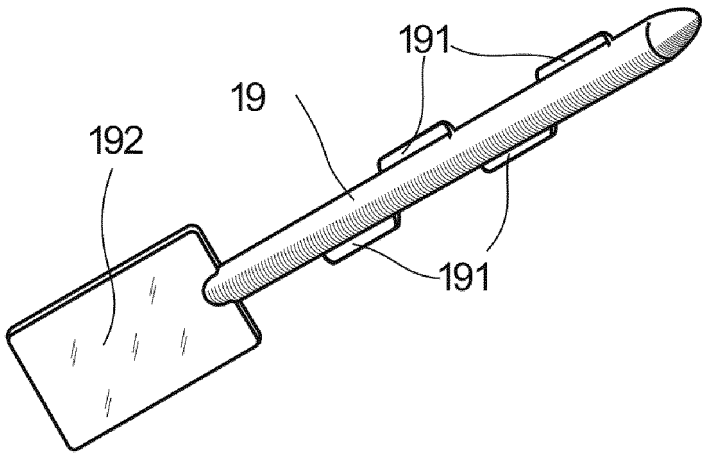

191
19
192
191

FIG.9

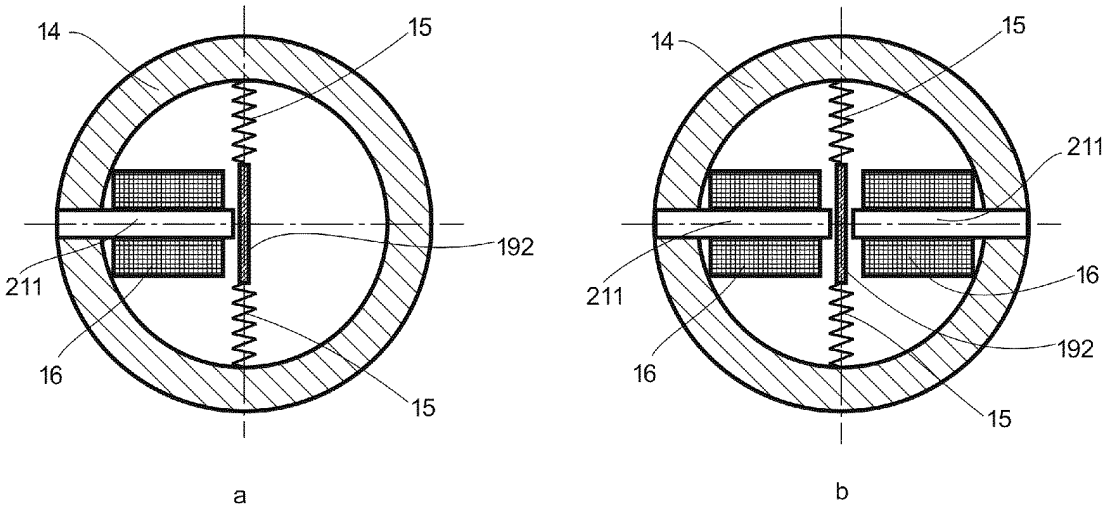

14
15
192
211
16
15
a
14
15
211
211
16
16
192
15
b

FIG.10

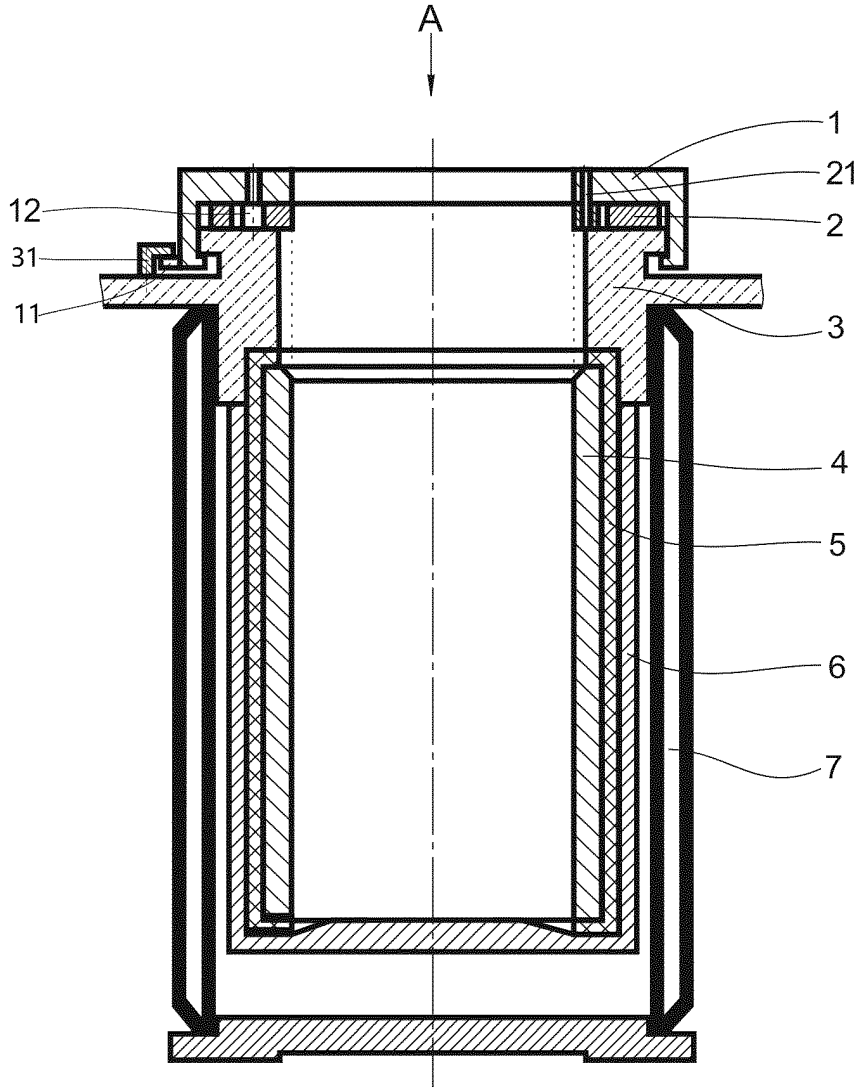
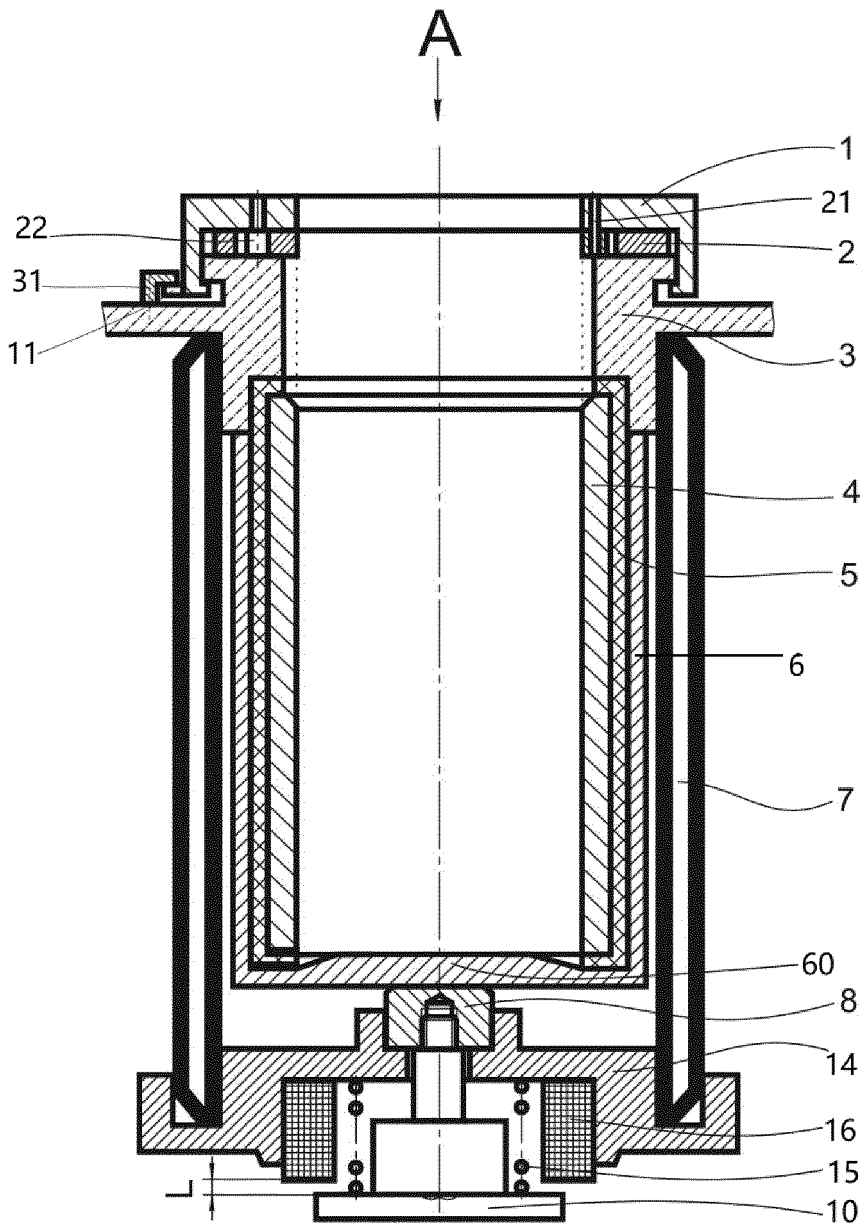

A
1
21
12
2
31
11
3
4
5
6
7

FIG.11


A
1
21
22
2
31
11
3
4
5
6
7
60
8
14
16
15
10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/118753

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/40(2020.01)i; A24F 40/46(2020.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT, CNKI, WPI, EPODOC: 云南中烟, 电子烟, 加热, 不燃烧, 夹紧, 低温, 锁紧, 抱紧, 密封, 密闭, 紧固, 固定, seal+, heat+, device, electronic, cigarette, non, burn+, low, temperature, revolv+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 210538933 U (CHINA TOBACCO HUNAN INDUSTRIAL CO., LTD.) 19 May 2020 (2020-05-19) description, paragraphs [0042]-[0063], and figures 1-7	1-10
A	CN 208863599 U (SHENZHEN INNOKIN TECHNOLOGY CO., LTD.) 17 May 2019 (2019-05-17) entire document	1-10
A	CN 106880086 A (CHINA TOBACCO YUNNAN INDUSTRIAL LLC.) 23 June 2017 (2017-06-23) entire document	1-10
A	CN 209983521 U (SHENZHEN INWELL TECHNOLOGY CO., LTD.) 24 January 2020 (2020-01-24) entire document	1-10
A	CN 208837103 U (SHANGHAI NEW TOBACCO PRODUCT RES INSTITUTE CO., LTD. et al.) 10 May 2019 (2019-05-10) entire document	1-10
A	WO 0028843 A1 (H.F.& PH.F. REEMTSMA G.M.B.H) 25 May 2000 (2000-05-25) entire document	1-10

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 January 2021	**03 March 2021**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2020/118753

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 210538933 U	19 May 2020	None	
CN 208863599 U	17 May 2019	None	
CN 106880086 A	23 June 2017	None	
CN 209983521 U	24 January 2020	None	
CN 208837103 U	10 May 2019	None	
WO 0028843 A1	25 May 2000	AU 6476899 A	05 June 2000
		EP 1128741 A1	05 September 2001
		DE 19854005 C2	17 May 2001
		DE 19854005 A1	18 May 2000

Form PCT/ISA/210 (patent family annex) (January 2015)